

AD-A215 788

THE NATURE OF MODERN WARFARE;
DECISIVE POINTS IN THE THIRD DIMENSION

A Monograph

by

Major Richard L. McCabe

Air Defense

DTIC
ELECTE
DEC 19 1989
S B D



School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

Second Term 88-89

Approved for Public Release; Distribution is Unlimited

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0186

| | | | | | |
|---|-------|--|---|---|--------------------------------|
| 1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED | | | 1b. RESTRICTIVE MARKINGS | | |
| 2a. SECURITY CLASSIFICATION AUTHORITY | | | 2. DISTRIBUTION/AVAILABILITY OF REPORT | | |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE | | | APPROVED FOR PUBLIC RELEASE; distribution is unlimited | | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S) | | | 5. MONITORING ORGANIZATION REPORT NUMBER(S) | | |
| 6a. NAME OF PERFORMING ORGANIZATION SCHOOL OF ADVANCED MILITARY STUDIES, USACGSC | | 6b. OFFICE SYMBOL (If applicable) ATZL-SWV | 7a. NAME OF MONITORING ORGANIZATION | | |
| 6c. ADDRESS (City, State, and ZIP Code) FORT LEAVENWORTH, KANSAS 66027-6900 | | | 7b. ADDRESS (City, State, and ZIP Code) | | |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION | | 8b. OFFICE SYMBOL (If applicable) | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER | | |
| 8c. ADDRESS (City, State, and ZIP Code) | | | 10. SOURCE OF FUNDING NUMBERS | | |
| | | | PROGRAM ELEMENT NO. | PROJECT NO. | TASK NO. |
| | | | WORK UNIT ACCESSION NO. | | |
| 11. TITLE (Include Security Classification) THE NATURE OF MODERN WARFARE; DECISIVE POINTS IN THE THIRD DIMENSION (U) | | | | | |
| 12. PERSONAL AUTHOR(S) MAJOR RICHARD L. MC CABE, USA | | | | | |
| 13a. TYPE OF REPORT MONOGRAPH | | 13b. TIME COVERED FROM _____ TO _____ | | 14. DATE OF REPORT (Year, Month, Day) 89-04-30 | |
| 15. PAGE COUNT 43 | | | | | |
| 16. SUPPLEMENTARY NOTATION | | | | | |
| 17. COSATI CODES | | | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) | | |
| FIELD | GROUP | SUB-GROUP | THIRD DIMENSION DECISIVE POINT AIR OPERATIONS | | |
| | | | COUNTERAIR OPERATIONS AIR DEFENSE OPERATIONAL TEMPO | | |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number) | | | | | |
| <p>RECENT CONFLICTS HAVE PROVIDED VALUABLE GLIMPSES AT THE LETHALITY OF THE MODERN BATTLEFIELD AND THE VULNERABILITY OF LARGE FORMATIONS, COMMAND AND CONTROL NODES, AND AIR DEFENSE ELEMENTS. THE 1967 SIX DAY WAR, THE 1973 YOM KIPPUR WAR, THE 1982 LEBANESE WAR, AND THE WAR IN THE FALKLANDS DEMONSTRATED THE POTENTIAL DOMINANCE OF AIR POWER IN A THEATER. THE NEUTRALIZATION OR DESTRUCTION OF THE ENEMY'S AVIATION BATTLEFIELD OPERATING SYSTEM (BOS) WAS A PIVOTAL FACTOR IN EACH CAMPAIGN.</p> <p>THIS MONOGRAPH FOCUSES ON THE CHARACTERISTICS OF MODERN COUNTERAIR OPERATIONS AT THE OPERATIONAL LEVEL OF WAR. IT EXPLORES THE APPLICATION OF THE CLASSICAL TERMS OF DECISIVE POINTS AND OBJECTIVE POINTS TO THEATER AIR OPERATIONS. EMPHASIS IS PLACED ON THE PHYSICAL, AND CYBERNETIC DOMAINS OF WAR AND THE CHARACTERISTICS OF SUCCESS HIGH TEMPO COUNTERAIR OPERATIONS. THE IMPORTANCE OF THE ELECTROGNETIC SPECTRUM AND ITS RELATIONSHIP TO FREEDOM OF ACTION BOTH IN THE AIR AND ON THE GROUND IS KEY TO THE ARGUMENT.</p> <p>IN THE NEXT MAJOR WAR, VICTORY WILL GO TO THE COMMANDER WHO IDENTIFIES HIS ENEMY'S</p> | | | | | |
| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS | | | 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED | | |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL MAJOR RICHARD L. MC CABE | | | 22b. TELEPHONE (Include Area Code) (913) 684-2138 | | 22c. OFFICE SYMBOL ATZL-SWV |

DECISIVE POINTS BOTH IN THE LAND CAMPAIGN AND IN THE AIR OPERATION AND DIRECTS OVERWHELMING COMBAT POWER AGAINST THEM. HIS FOCUS WILL BE ON DOMINANCE IN THE ELECTROMAGNETIC SPECTRUM AND NEUTRALIZING OPPOSING AIR WITH STRIKES AGAINST OBJECTIVE POINTS AT TEMPOS TOO HIGH FOR THE OPPONENT TO CONTROL. THE REWARD WILL BE FREEDOM OF ACTION ACROSS THE THEATER.

**The Nature of Modern Warfare;
Decisive Points in the Third
Dimension**

by

Major Richard L. Mc Cabe

Air Defense

**School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas**

30 April 1989

Approved for public release; distribution is unlimited

(A)

ABSTRACT

THE NATURE OF MODERN WARFARE--DECISIVE POINTS IN THE THIRD DIMENSION by Maj. Richard L. McCabe, USA, 43 pages.

Recent conflicts have provided valuable glimpses at the lethality of the modern battlefield and the vulnerability of large formations, command and control nodes, and air defense elements. The 1967 Six Day War, the 1973 Yom Kippur War, the 1982 Lebanese War in the Bekaa Valley, the War in Afghanistan, and the War in the Falklands demonstrated the potential dominance of air power in a theater. The neutralization or destruction of the opponent's aviation battlefield operating system (BOS) was a pivotal factor in each campaign.

This monograph focuses on the characteristics of modern counterair operations at the operational level of war. It explores the application of the classical terms of decisive points and objective points to theater air operations. Emphasis is placed on the physical, and cybernetic domains of war and the characteristics of successful high tempo counterair operations. The importance of the electromagnetic spectrum and its relationship to freedom of action both in the air and on the ground is key to the argument.

In the next major war, victory will go to the commander who identifies his enemy's decisive points both in the land campaign and in the air operation and directs overwhelming combat power against them. His focus will be on dominance in the electromagnetic spectrum and neutralizing opposing air with strikes against objective points at tempos too high for the opponent to control. The reward will be freedom of action across the theater. (KR)E



| | |
|--------------------|--|
| Accession For | |
| NTIS GRA&I | <input checked="checked" type="checkbox"/> |
| DTIC TAB | <input type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| Justification | |
| By | |
| Distribution/ | |
| Availability Codes | |
| Dist | Avail and/or Special |
| A-1 | |

TABLE OF CONTENTS

Page

| | | |
|------|-------------------------------|----|
| I. | Introduction..... | 1 |
| II. | The Nature of Modern War..... | 4 |
| III. | The Focus of Execution..... | 22 |
| IV. | Conclusion..... | 29 |

List of Figures:

| | | |
|----|---|----|
| 1. | The Modern Theater..... | 6 |
| 2. | Tempo Versus Window of Opportunity..... | 16 |
| 3. | Relative Decline in Combat Power..... | 18 |
| 4. | What Must Be Killed..... | 23 |
| 5. | Soviet Aviation Control System..... | 25 |

Appendix:

| | | |
|--|---|----|
| | Corps Level SEAD Operations Overview..... | 34 |
| | Endnotes..... | 36 |
| | Bibliography..... | 39 |

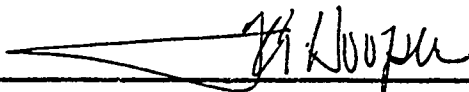
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

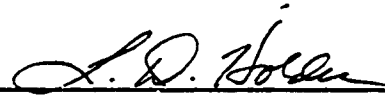
Name of Student: Richard L. McCabe, MAJ, Air Defense Artillery

Title of Monograph: Considerations for the Protection of
Operational Maneuver: The Third Dimension

Approved by:



LTC Thomas A. Hooper, MA Monograph Director



COL L. D. Holder, MA Director, School of
Advanced Military
Studies



Philip J. Brookes, Ph.D. Director, Graduate
Degree Program

Accepted this 15th day of May 1989

INTRODUCTION

Modern operational level commanders must think in terms of cubic space in the formulation of campaign plans. No longer can a commander think exclusively in terms of ground battle. Every element of combat power--maneuver, firepower, leadership, protection--is subject to attack not only in the traditional ground dimension but also from the air by advanced aircraft, missiles, sensors and various aerial platforms. No place in a theater is invulnerable; potentially decisive action can come from virtually anywhere on a three dimensional battlefield. Therefore, a theater must not be defined strictly in terms of depth and breadth but in cubic space as well. The air dimension of AirLand Battle has become critical and can dominate both offensive and defensive operations.

In modern warfare, success in the air operation comes only through executing a well thought out, integrated, and synchronized plan. Operations in the electromagnetic spectrum that emphasize a mastery of the elements of time and space are essential parts of this planning effort. To be successful, particularly with limited means, these efforts must be skillfully directed toward some point of concentration; a 'decisive point.'

Some argue that there cannot be an airspace decisive point since there are no geographical features on which to focus. This argument fails to adapt the broad concept of

decisive points to all contiguous space within the theater. FM 100-5, Operations, states that the airspace over a theater is as important as the terrain itself.¹ In other words, AirLand Battle Doctrine rightfully removes the artificial boundaries restricting classical theories of war to the terrain.

Just as in the land campaign, control of the decisive point in air operations gives one antagonist a tremendous advantage over the other. It follows then, that a theater commander who successfully directs his combat power at an air decisive point potentially gains the benefit of freedom of action. Success in the air dimension allows him to project protected combat power toward the decisive point of maneuver and accomplishment of operational objectives. In the words of Baron De Jomini;

I think the name of decisive...point should be given to all those which are capable of exercising a marked influence either upon the results of a campaign or upon a single enterprise.²

I agree with Jomini. Decisive points and the action directed at them are critical to battlefield success. To illustrate that point this monograph looks at the air component of modern battle. It seeks first to identify decisive points in air operations, then to investigate the key combat actions which can be effective against those points. It begins by defining the nature of war as it is today. It paints a picture of the modern theater based on

military campaigns since 1967 that incorporated new technology to varying degrees. The relationship between decisive points in the moral, physical, and cybernetic domains of war provide a theoretical perspective as a point of departure.

THE NATURE OF MODERN WAR .

Potential theaters of war and theaters of operations vary in dimension, composition, and content. No two are exactly alike and the employment of military means within them will vary accordingly. However, all share a common aspect; they are each a potential canvas for the application of operational art.

FM 100-5, Operations, states that operational art:

is the employment of military forces to attain strategic goals in a theater of war or theater of operations through the design, organization and conduct of campaigns and major operations.³

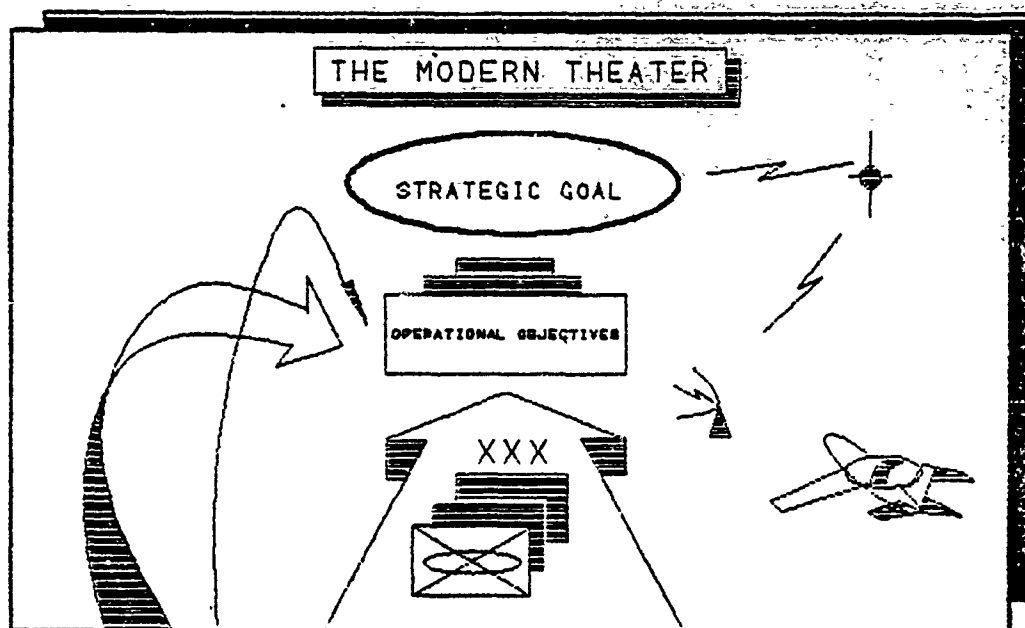
There is a strong element of creativity involved in operational art that, because of the scale of means likely employed, differs from the planning and execution of tactical level combined arms operations.

At the operational level of war, the concept of operations should be founded on a flexible approach to achieving theater objectives. The means at hand should be directed at the enemy's weaknesses in the context of the theater's operational conditions. Based on the mission, enemy situation, terrain, time and troops available (METT-T), multiple paths (branches) to the objectives should be identified. Ideally, these branches should capitalize on the imperative of speed and the element of surprise. While easy to conceptualize, actually performing operational art in a way that leads to success is far more difficult. In the words of a senior Army officer;

...Jomini's old prescription of concentrating the greatest possible strength at the decisive time and place remains a worthwhile goal; the problem of determining where and how is the challenge as it always has been.⁴

Through technology, the tools of operational art have evolved a great deal in terms of lethality and overall capability. This technology is shared and employed in various forms by all service components in a theater. Decisive strokes may be applied by each of them. FM 100-5, Operations, indicates that a theater commander should combine arms and sister services to complement and reinforce each other to pose a dilemma for the enemy.⁵ This makes the conduct of operational art an undeniably joint activity.⁶

Figure 1 illustrates a view of operations in a modern theater. The chart shows the involvement of all three dimensions including the perspective of depth with operational objectives sequenced toward a strategic goal. Rapid large unit moves and aerospace activity (including advanced sensors, electronic warfare, satellite imagery and communications, airborne early warning and command and control, and ballistic missiles) play important roles in the modern theater. Ideally, success is assured when each of these is focused on the theater objectives. What Figure 1 does not show is the difficulty in arranging these activities in a manner that allows unity of effort toward a common objective. The realities of uncertainty and chance translate this 'war on paper' into 'real war.'⁷



[Figure 1.]
THE MODERN THEATER

In war, a theater commander determines the military condition needed to achieve the desired goal, the feasible sequence of events which achieve the goal, and the way forces at his disposal can be effectively used to execute the desired sequence.⁸ Assuming that the theater commander has resolved the first two questions, we can consider the third beginning with the thoughts of J.F.C. Fuller:

An Army is the instrument with which every species of military activity is performed; like all other machines it's composed of various parts; and its perfection will depend first on that of its various parts; and second, on that of the manner in which they are arranged; so that the whole may have the following properties, viz. strength, agility, and universality; if these are properly combined the machine is perfect.⁹

This quote describes a device of great combat power where each element functions in perfect tune. There are of course obstacles which prevent a joint force from reaching the operational utopia that Fuller depicts. Assembled together these various obstacles take the form of friction which acts directly on the elements of combat power; maneuver, firepower, leadership, and protection.¹⁰ The result is a military instrument that is not as well oiled or in tune as the operator (the commander) would prefer.

Friction, the resistance to smooth and relatively unrestrained operation, is created by any number of things. On the modern battlefield, three features will undoubtedly figure very prominently; the battle for time in the pursuit of high tempo operations, the battle for the electromagnetic spectrum, and the nature of joint warfare. These three factors are obviously interrelated. They each act collectively and independently to impair speed of execution and unity of effort.

Major military campaigns since 1967 involved the use of many or all of the components illustrated in Figure 1 and provide good insights into the nature of the modern theater. This paper emphasizes the conduct of the air operations in these campaigns and shows their relationship to the protection of operational maneuver.

In preparation for the Six Day War, the Israelis carefully assessed their relative combat power as opposed to the surrounding Arab states.¹¹ Their principle concern was

the limited number of combat aircraft for sustained counterair operations. Available intelligence indicated the need for a preemptive strike capable of eliminating most of the Arab aircraft on the ground. Only in this way could they neutralize the Arab air capability early enough and decisively enough to ensure success on the ground. Planning for this mission demanded detailed calculations in time and space. As Edward Luttwak reports:

...the IAF had to reduce the time needed for 'turn-around' (return flight, landing, refueling, rearming, debriefing, and target briefing) until it corresponded to the length of waves in the battle plan.¹²

Potential targets were monitored constantly to ensure up to date information. The type and amount of ordnance needed for the strikes was carefully calculated. Targets were prioritized for optimal effect since few Israeli aircraft were specifically designed for this type of mission.

As they conducted their planning it became apparent that counterair operations would be critical. Sustaining intensive counterair operations required the destruction or neutralization of the enemy surface to air missile systems and antiaircraft artillery. Appendix A provides an overview of the type of activities and coordination involved in suppressing enemy air defense systems. To protect their bases of operations, the Israelis had to organize their

surface air defense systems and limited fighter support to protect fixed facilities and land forces.

All of these tasks would be difficult enough to coordinate and synchronize without the elements of uncertainty and chance. As chance would have it, the war actually came when the I.A.F. was in transition between weapons systems further reducing available means. Coordinating effective operations became even more difficult.¹³ However, Israeli confidence remained high that in spite of the Arab's numerical edge the I.A.F.'s preemptive strike would still be successful. As Luttwak explains;

In a contest of superiority over the battlefields, the fast turn-around (as little as seven to ten minutes)...would magnify the effective strength of the I.A.F. as compared to the slower Arab air forces; this and the difference in pilot quality, was expected to offset the Arab's four to one superiority in the number of combat aircraft.¹⁴

The plan worked almost flawlessly. It established the necessary preconditions for total victory. The Israelis won the war in five days in large part because of this decisive counterair operation. Careful planning and synchronization of air operations with operational maneuver (to the highest degree possible), speed in execution, and effective intelligence combined to produce Israeli success in 1967.

The Yom Kippur War was not characterized by similar detailed planning. The Israelis were initially surprised and overwhelmed by the speed of the Egyptian crossing of the Suez. The exceptionally dense Egyptian SAM, AAA, and

fighter defenses denied the Israelis air superiority and with that denial the ground forces' freedom of action was severely curtailed. Not until Israeli ground forces crossed the Suez and destroyed a number of air defense systems and C² facilities could the I.A.F. seize the initiative in the air.¹⁵ Once this was done, however, the ground commander was able to apply protected combat power decisively.

Egyptian forces initially did not advance beyond their air defenses. When they tried, Israeli air power was applied in a decisive way. According to the former chief of staff of the Egyptian army;

Once in open country outside the protection of...SAMs, the infantry was routed by the [Israeli] air force. Not a single enemy tank or field piece fired a shot. The decisiveness of the attack was a reminder...if [one was needed] of how open...ground forces are to air attack the moment they left the SAM umbrella.¹⁶

The circumstances were different during the Israeli's 1982 attack into Lebanon. The problems the Israelis faced there were even more complex. The air defense-counter air defense battle in the Bekaa Valley during 'Operation Peace for Galilee' provides a good example of the employment of sophisticated means toward operational and strategic ends. The Israelis used extensive electronic counter measures (ECM), remotely piloted vehicles (RPVs), and standoff systems to destroy and neutralize Syrian early warning and air defense radars. Air launched standoff smart munitions and laser guided bombs with designation from RPVs had great

effect against priority point targets. Cluster munitions were employed against dispersed air defense units and tactical rockets with homing heads were directed at electronic emitters. All of this was coordinated with airborne command and control and aided by airborne early warning.¹⁷

Decisive results in the Israeli air operation in Lebanon depended on surprise and speed. Its effectiveness is summarized well by this paragraph from James Gibson's account of the war;

In the end, the destruction of the SAM missile batteries and the loss of 62 aircraft on June 9-10 meant that the Syrian forces in Lebanon, outnumbered and outmaneuvered, had to operate with a total lack of air cover that placed them at the mercy of Israeli aircraft and helicopter attacks. Moreover, Syrian forces in the Bekaa and along the Damascus highway couldn't reinforce their units without being spotted by Israeli intelligence and attacked on the way to the battle area...¹⁸

The Lebanon crisis demonstrates the synergy possible by the effective integration of multiple combat systems. The crisis in the Falklands, however, shows the result of a failure to perform this vital operational function.

The Argentine air force had an overwhelming numerical advantage over the British whose ground based air defense systems were marginally effective. While never actually winning air superiority, the British were able to protect their fleet and amphibious landing force with 32 Sea Harrier aircraft and limited anti-aircraft support.¹⁹ They achieved

protection because the Argentinians misemployed available weapons and lacked cooperation among their services. These errors allowed the British to control the tempo of battle despite significant losses. The Argentinian's will to fight was eventually exhausted as the British gained freedom of action.²⁰

While freedom of action is clearly important in a limited conventional war like the Falklands, it is also important in unconventional warfare.

Under the right circumstances and with the right technology, a guerilla force may also be able to control the tempo of operations against a more modern, technologically sophisticated force. In Afghanistan (1979-89), the Mujahedeen were struck with punishing tactical blows from Soviet aviation.²¹

While the Mujahedeen force was very agile in the ground battle, the flexibility of Soviet air (fixed and rotary wing) effectively precluded a decisive insurgent victory.²² The Mujahedeen needed to gain at least limited control of the airspace over the battlefields in order to retain the initiative.

The introduction of the 'Stinger' missile system changed the terms of the battle in the theater:

For a month after the first stinger kills, Soviet/[Afghan] offensive flight operations stopped. When flying resumed, Stinger continued to kill despite flares and procedural countermeasures.²³

The enhanced Mujahedeen freedom of action provided by a single weapons system (Stinger) can be measured by the difference in the conduct of operations before and after it's employment. According to available reports, prior to August 1986, the Mujahedeen conducted raids and ambushes, attacked by fire, and broke contact when Soviet or Afghan air support arrived over the battle area. After Stinger employment, they systematically reduced enemy garrisons and outposts by siege. Stinger effectively countered the air threat. Air interdiction became ineffective because ordnance was released at greater altitudes and ranges. Unrestricted movement of Mujahedeen troops and supplies became normal.²⁴ Ultimately, the conflict became too costly for the Soviets and their will to continue the fight was broken; much like the Argentinians in the Falklands.

If considered on the whole, these operational examples offer significant insight into the nature of war in a modern theater. The impact of air power (the aviation battlefield operating system) is obvious. It is also essential to orient all services toward a common objective and to properly integrate modern technology into the theater's third dimension for optimum synergy. The key observation, however, concerns the basis for success in military operations; freedom of action.

The freedom necessary for successful operational maneuver is directly connected to successful counterair operations. As several of the case studies show, the

prerequisite for that success is freedom of action in the electromagnetic spectrum. By winning the battle for the electromagnetic spectrum operational commanders are able to capitalize on the potentially dominant combat power that can be applied from the air.

The electromagnetic spectrum has gained substantial importance as modern combat forces seek to exploit it as both a means of command and control and as a weapon. Two critical components of the electromagnetic spectrum are; command, control, and communications (C³), and electronic warfare (EW). Each will be addressed in turn.

The functions of command are exercised more and more through this medium. Leadership, as an element of combat power, is tested by the quality of communications available to relay essential elements of information. Effective command decisions demand field input expressed as critical information. That critical information can be seriously delayed if theater forces lose the battle for electromagnetic dominance. Degraded command, control and communications (C³) makes the functions of leadership at the operational level of war extremely difficult.

The U. S. Army's C³ is outlined in the Army Battlefield Interface Concept or ABIC. The concept describes a complex system of communications and data links which are spread over the entire area of operations.²⁵ The proposed netting is very complex. The enemy can be expected to attempt to exploit the characteristics of the system by using standoff

platforms and RPVs to locate and disrupt essential nodes. If possible he will also employ surface to surface missiles and aircraft delivered "smart" munitions to disrupt or destroy it.

If successful, he complicates greatly the task of protecting the combat power of maneuver forces. As FM 100-5, Operations, states;

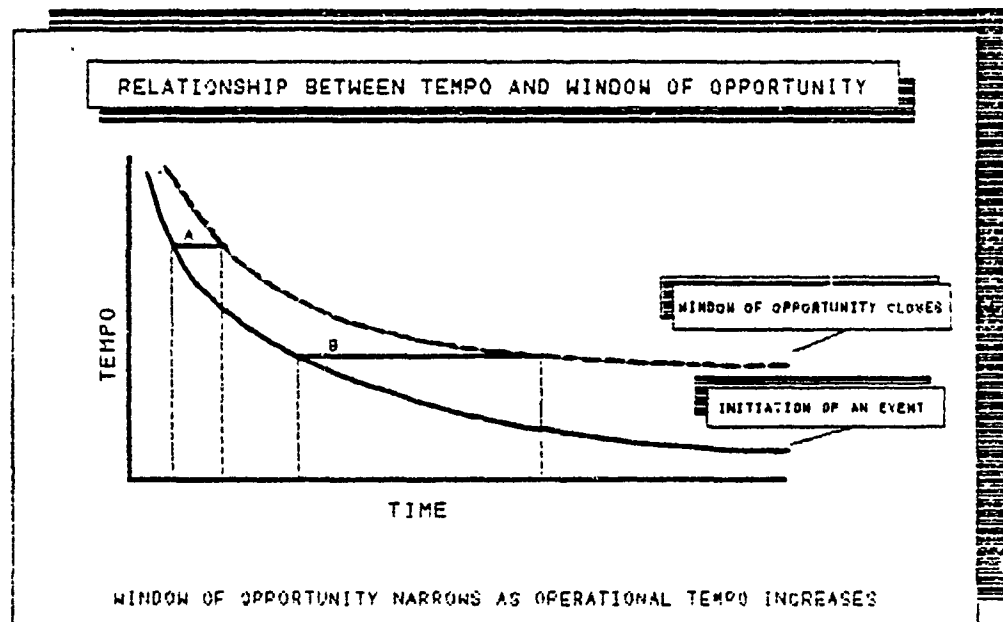
...effective operational maneuver consists of the ability to position forces in such a way as to tip the local combat power balance in one's favor... [and is a function of]...effective command, control and communications 46

At the operational level of war, good command and control is the "tie that binds." How good it is depends, to a great degree, on freedom of action in the electromagnetic spectrum.

The spectrum also affects another aspect of combat operations: fires. With electromagnetic dominance, effective application of fires against enemy decisive points can be done at an operational tempo too high for the enemy defenses to control; thus, winning the battle for time. In the end, the ground commander is able to retain freedom of action to maneuver and direct the mass of his protected combat power against enemy vulnerabilities.

The battle for time is depicted in Figure 2. The chart shows the conceptual relationship between operational tempo and the defender's window of opportunity. To be successful the tempo of an operational event (depicted with the solid

curve) must be so high that the opponent's window of opportunity is extremely narrow (A). The distance between the two curves at a given tempo represents the window of opportunity where successful countermeasures are possible. To be effective, the opponent must act before his window of opportunity closes (the broken curve).



[Figure 2]
TEMPO VERSUS WINDOW OF OPPORTUNITY²⁷

This illustration shows the importance of sustaining the highest possible operational tempo (the vertical axis) and is equally valid for both air and maneuver actions.

The Israeli Air Force demonstrated this concept in the Six Day War and in Lebanon. During both, the Israeli air force arranged limited assets in the most efficient manner

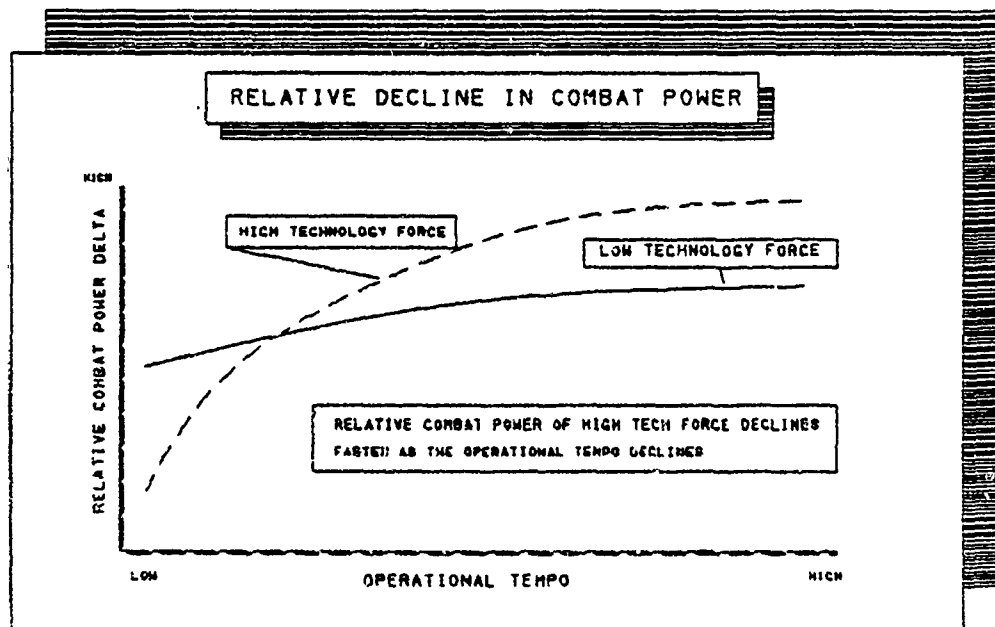
possible. They maintained an operational tempo at the highest possible level. The corresponding window of opportunity was too narrow for the Arabs to organize a successful defense given their comparatively slower rate of operations. In other words, the Arabs functioned in window 'B' while the Israelis operated in 'A'.²⁸

The window of opportunity operational tempo paradigm confirms that, even with a technological advantage, failure to observe the AirLand Battle imperative to 'move fast, strike hard, and finish rapidly' permits an enemy with modest means a much larger window of opportunity for a successful defense. This is equivalent to piecemeal commitment of forces.

Figure 3 conceptually depicts the potential effects of committing a 'high tech force' at too low an operational tempo. At lower tempos, the low tech force has a large enough window of opportunity to effectively react to the 'high tech' opponent's actions. In other words, he has greater flexibility and gains agility. This makes it possible for him to maximize the effect of his weapons. Therefore, even with less sophisticated weapons, an antagonist can prevail if he is able to force the tempo of the battle to the lowest possible level. This might be done through supporting operations such as early warning.

A higher technology force will likely be based on fewer systems of greater capability, lethality, and expense. We have seen a greater reliance on technology as a combat

multiplier in new weapons. Estimates of relative combat power frequently give modern weapons systems a value that is one or more orders of magnitude higher than that of typical enemy systems.²⁹ The loss of one system could be considered the equivalent of three enemy systems in terms of relative combat power.



[Figure 3.]
RELATIVE DECLINE IN COMBAT POWER

Should an antagonist with lower technology be able to maintain the edge in attrition (defined here as a one for one exchange) his relative combat power will decrease at a slower rate than his high technology opponent.

The British in the Falklands, with limited early warning and comparatively modest technological means,

defeated a more powerful and advanced air force. Poor Argentine inter-service cooperation and low tempo attacks provided the British with a window of opportunity adequate for success.³⁰

The need to maintain a high tempo in combat operations is not solely a result of high technology. Classical theorists recognized the need in joint and combined arms operations long ago. Improved technology simply enhances its importance. As Fuller said:

The first problem in tactics should be this: How given a number of men to be ranged so that they may move and act with the greatest velocity; for on this chiefly depends the success of all military operations.³¹

Fuller's problem is more significant when a theater commander's combat assets are provided by more than one service. Arranging the efforts of all those services in time and space to achieve optimal velocity is a great challenge. In fact, the nature of joint warfare; the bringing together of various services to achieve a common objective, offers the opportunity for confusion and the disruption of unity of effort. At the operational level, 'Blue Suit' air power is firepower for the theater commander just as theater counterair is his means of controlling the enemy's air power.³² Maneuver and firepower are inseparable and complimentary elements of combat power.³³ Combined arms and services must reinforce and support each other. By doing so, the operational effect is greater than the sum of

their individual contributions and synergy is achieved on the battlefield. If well done, this poses a dilemma for the enemy in that it complicates his ability to employ his weapons effectively.³⁴

The requisite coordination involved in achieving this level of cooperation is difficult to reach but none the less crucial. The 1982 Bekaa Valley operation, where freedom to maneuver was ensured through decisive air action, is an example of the fruits of effective joint operations aimed at a common goal. Alternatively, the poor interservice cooperation in the Argentine military resulted in piecemeal commitment of forces, a disjointed plan, and defeat.

As recent history shows, all the forces in a theater must be considered land/air forces.³⁵ Successful operations require the integration of both types of force. When the enemy potential for air operations is significant, it must be countered by decisive integrated action early in the campaign.³⁶ That action must be based on a common understanding of exactly what is and is not decisive in the context of the theater.

In order to achieve unified action suitable objectives must be selected for each component. Objectives are appropriate in terms of their decisiveness in support of the theater plan of maneuver and not simply because they are more or less viable. Identifying decisive points in the air operation in the context of the theater campaign plan

focuses and helps synchronize airland operations. In turn, the theater commander may gain freedom of action.

While events of one war are not necessarily applicable to another, the conflicts studied in this paper suggest some important insights. The specifics may vary between the case studies and future conflicts but there are important common characteristics. In each case, control of the theater airspace was decisive for success. The winning side either destroyed or neutralized the effects of the enemy's aviation or air defense battlefield operating systems. The next section approaches the enemy's aviation operating system as a target which must be taken apart, that is to say, divided into pieces and defeated in detail.

THE FOCUS OF EXECUTION

There are decisive points in air operations just as there are in maneuver though perhaps they are not quite as readily visible. From these decisive points, objective points can be identified for the application of operational and tactical fires. In the planning process, these objectives orient combat power, regardless of system or service, along lines that are appropriate for the theater commander's mission and desired end state. This ultimately leads to the most efficient use of joint assets and avoids waste. Synergy between components of the force enables the commander to maintain the highest possible tempo of operations.

The flexibility of air power is in part due to the effectiveness of the supporting infrastructure that provides targeting and guidance. A good example is the Soviet aviation control system which incorporates great numbers of assets over a large operational area. The importance of this C³ network is measured in terms of the volume of combat power that it can direct at opposing maneuver forces.

Figure 4 is a breakdown of weapons that are likely to be directed against U.S. forces by a Soviet style threat. It represents a potentially decisive capability. Independent air is not reflected in the chart but might also be employed should the enemy commander view his opponent's operation as having strategic impact.

| ECHELON | SUPPORTING SYSTEMS | APPROX # AC/Lehr |
|----------|-------------------------|------------------|
| Front | Fighter Division | 108-144 a/c |
| | Fighter Bomber Division | 108-144 a/c |
| | Fighter Inter. Division | 108-144 a/c |
| | Trans. Helic. Regt. | 24 Mi-6 Hcok |
| | | 32 Mi-8 Hip |
| | TBM Bde | 12-18 SS-12/22 |
| CAA | TBM Bde | 12-18 SS-1 |
| | Gen Purp. Hel. Sqdn. | 18 Hel. |
| | Attack Hel. Regt. | 20 Mi-8 Hip |
| | | 40 Mi-24 Hind |
| Division | | 12-18 SS-1/23s |
| | TBM Bde | 6 Mi-2 Hoplite |
| | Hel. Sqdn. | 6 Mi-8 Hip |
| | | 6 Mi-24 Hind |
| | TBM Bn | 4 Frog-7/SS-21 |

[Figure 4.]
WHAT MUST BE KILLED³⁷

The variety and number of weapons in Figure 4 depicts the complexity of the battlefield, the importance the Soviets place on the air dimension, and the heavy investment they have made in the airspace over the theater. Soviet writings indicate that they are modernizing aircraft and missile systems for greater range, speed, and accuracy. If true, the writings hint at the way they view the future battlefield.³⁸

Neutralizing or destroying the C³ system that brings this force to bear is a potentially decisive stroke. Operational level intelligence preparation of the battlefield (IPB) is an important part of the targeting process. At the operational level of war, identifying ports, airfields, road networks and major physical features only contribute part of a complete picture of the

situation.³⁹ The threat integration process must consider the means with which the enemy exploits theater airspace.

The IPB process should identify areas that are suitable for the employment of specific weapons, and command and control centers. Named areas of interest (NAIs) should be established to cover them. Terrain that satisfies the specifications for launch sites for tactical ballistic missiles (TBMs) should also be the subject of collection efforts. Identifying likely helicopter rearm and refuel points, potential sites for radar guidance and aircraft navigational aids is a step toward neutralizing an enemy's flexibility in the air.⁴⁰

It is not feasible to be strong everywhere. By identifying critical nodes in the enemy's C³ system, counterair operations can best complement the theater concept of maneuver. Decisive points and objective points in the airspace dimension that contribute directly to freedom of action can be attacked.

It is hard to see how the traditional notion of decisive points relates to the air operation, but it is possible. There are, of course, no prominent geographical features in the air that offer a decisive advantage to the possessor. If, on the other hand, decisive points are considered in the context of the physical, cybernetic and moral domains of war, the validity of their use is arguably appropriate to air and counterair operations.⁴¹ An example in the cybernetic domain makes the point.

The cybernetic domain (as applied here) is the command and control apparatus which allows combat power to be directed toward the objective.⁴² It follows that the inability to direct the employment of the flexible combat power of air forces or army aviation toward their objective (target) could prove decisive in a theater of war. The impact on the enemy's ability to effectively control the airspace over the theater would be substantially impaired and with it his overall chances for victory.

Figure 5 is an overview of the elements of the Soviet aviation control system. It's an example of a decisive point in the air operation. The six elements listed are examples of potential objective points which may or may not be vulnerable to attack. If successfully struck individually or collectively, the damage might be decisive to the overall air operation.

-
1. Aircraft and airfields; Front, CAA, Division
 2. Ground Control Intercept Installations
 3. Vector and Target Designation Points (VTDP)
 4. Radio Navigation Points
 5. Rearm Refuel Points (RARPs)
 6. Forward Air Controllers (FACs)
-

[Figure 5]
SOVIET AVIATION CONTROL SYSTEM

All of the elements in this system have their own very distinct signatures and they may be targeted by other than aviation weapons systems.⁴³

The effective employment of tactical ballistic missiles, drones, and standoff platforms also depend on a system of command and control. That system is vulnerable to targeting or disruption. As technology improves, real time targeting of large formations and critical assets will become possible. Neutralizing the supporting C³ system must be done on a broad scale. The number, variety, and dispersion of all the potential targets probably means available resources will be inadequate for wholesale attack. All of the nodes simply can't be targeted. However, a detailed analysis of range and capability determines the truly significant and accessible targets and helps establish realistic objective points.⁴⁴

Objective points in this context are those identified nodes in the enemy command and control systems at which the theater commander directs fires. If accomplished, the theater commander gains greater freedom of action. For instance, if actions force enemy airframes to remain idle on their bases, an opportunity exists to strike the decisive point in the physical domain; the enemy weapons systems and their means of support.⁴⁵

A high density of forces makes the physical decisive point in the counterair operation a difficult object to target. There are simply too many individual systems and bases at the enemy's disposal. Although difficult, it is possible to preemptively strike appropriate physical

objective points, and control the physical decisive point as the Israelis proved in 1967 when:

The Israeli Air Force destroyed the Egyptian Air Force on the ground in a matter of hours with a 5 June preemptive air attack. Five days later the war ended...the Israelis victorious.⁴⁶

Objective points for the physical domain are those bases and facilities that are actually targeted. Though oriented on the counterair campaign, this targeting effort includes the use of long range artillery or other means as the situation warrants. Objective points should be attacked by the most economical means available regardless of service, but always with the goal in mind of freedom of action for the theater commander.

The moral domain in the enemy aviation battlefield operating system is accessible through decisive attacks against the objective points in the cybernetic and physical domains. The application of intensive electronic countermeasures against the Syrians in the Bekaa Valley during Operation 'Peace for Galilee' not only neutralized the Syrian ground based air defense system and means of surveillance, but also created the confusion that makes rational decisions difficult in war.⁴⁷ The moral implications of this situation are perhaps not fully appreciated in writings about the campaign, but available evidence indicates that the effect spread across the entire Syrian battlefield.

As an example, the lack of air cover for the Syrians in the Bekaa Valley prevented reinforcement of front line units and inhibited resupply.⁴⁸ Syrian maneuver elements were at the mercy of the I.A.F. because they had no significant countermeasures. Units became isolated. As the situation worsened for the Syrian Air Force, pilots became more reluctant to engage their Israeli counterparts decisively.⁴⁹ These facts indicate conditions which promoted the moral disintegration of fighting forces. The Israelis emerged victorious after neutralizing the enemy aviation battlefield operating system and striking the decisive points affecting the theater's third dimension.

As successive objective points are struck with good effect and decisive points in the counterair operation are seized, the theater commander gains freedom of action. As James Schneider says:

The seizure of a series of decisive points...gives rise to the initiative.⁵⁰

Retaining freedom of action in the air provides greater operational flexibility. This comes from enhanced protection of the theater commander's combat power. Under these conditions, he has the flexibility to apply protected combat power against decisive points in all dimensions. The campaigns briefly discussed show that an opponent's ability to seize the initiative is highly questionable without an effective aviation BOS in his support.

CONCLUSION

Modern warfare is exceptionally lethal. Technology has produced weapons much more capable than those of the past. The conduct of operations at the operational level must reflect the state of technology on today's battlefield while adhering to the historical warfighting principles.

The advent of remotely piloted vehicles, advanced aircraft, smart munitions and accurate tactical ballistic missiles (among other things) has made counterair operations extremely complex but more essential than ever before. There is no safe quarter; the elements of combat power are subject to attack from all three theater dimensions; depth, breadth and height. This has been graphically demonstrated to one extent or another in recent conflicts from the middle-east to the Falklands. These lessons can help orient the U.S. Army as it thinks about winning its next major conflict.

As we have seen in the campaigns briefly discussed in this paper, preserving protected combat power so that it can be applied at the right time and place is a major problem at the operational level of war. The potential dominance of air power places great emphasis on the linkage between theater air operations and the theater plan of maneuver.

This linkage begins with a high degree of interservice cooperation; the mutual understanding of what is and is not decisive between services. A common understanding of the

decisive points in the air operations of the theater campaign is an important step in the evolution of the two services functioning as a unified whole. The theater commander should be able to employ his 'joint' aviation operating system as an integrated whole; an element of combat power at the operational level of war. This would enhance his ability to attain theater goals according to AirLand Battle Doctrine.

FM 100-5, Operations, establishes four tenets of AirLand Battle; initiative, depth, agility and synchronization. It says:

In a nutshell...initiative means making the enemy fight the campaign according to the terms we set. Agility requires that we act more quickly than the enemy is able to. Our decision cycle must function within his to our advantage. Depth implies our need to extend the theater in space and time and resources all critical to effective operational maneuver...The process of synchronization, arranging all battlefield activities in time and space and purpose, results in operations which produce decisive results at the right time and place.⁵¹

The events of history's most recent wars demonstrate that the airspace over the theater is critical to fighting by the tenants of AirLand Battle. The potentially dominant firepower available from the air is decisive when applied at operational depth, synchronized with the theater plan of maneuver, and at the highest operational tempo consistent with its potential for agility. To maintain the initiative, however, combat power from the theater's third dimension

must be directed at decisive points in the opponent's air operation.

The decisive points in the counterair fight occur in the physical, cybernetic and moral domains of war and each bears on the other to some degree. If properly identified and effectively attacked, controlling these decisive points gives the operational commander the flexibility to choose the best branches or sequels to his operational plans. Agility is therefore enhanced through the synchronized execution of the counterair operation.

The application of the protected combat power that results from dominating the airspace over the theater permits higher operational tempos than the enemy's defenses can control. This can result in achieving one of the AirLand Battle's most important imperatives; 'move fast, strike hard, and finish rapidly.'⁵²

Retaining freedom of action in the electromagnetic spectrum is becoming increasingly important. Future means of command, control, and communications involve the use of complex electronic systems that will be stretched over the entire battlefield. If given a large enough window of opportunity, the enemy commander may attack this C³ system to decouple each of the elements of combat power. It is not possible to seize and maintain the initiative without electromagnetic dominance.

The use of air power to isolate an enemy force on the ground could be considered the same as depriving that force

of its internal lines. That is to say, normally, internal lines permit formations to link up more rapidly, to reinforce and resupply easier than opposing formations on external lines. If applied at a sufficiently high operational tempo, with command of the electromagnetic spectrum, air power can remove these advantages; depriving opposing formations of their "central" position.

A reading of FM 100-5, Operations, may not necessarily provide a clear vision of the nature of war in this technologically advanced age. It is very difficult to appreciate the high tempo and lethality of modern conventional battle. The doctrinal fundamentals are certainly there and if applied in the right context will serve us well. The difficulty is simply appreciating the rapid pace of combat in a modern theater. Systems that shoot farther and faster with greater accuracy and more lethality create an environment that can't be replicated in training exercises. To be successful, commanders must immediately be able to recognize windows of opportunity and apply AirLand Battle fundamentals before the enemy can react. This must be done in a fast paced battle unlike any the U.S. Army has fought in the past.

The window of opportunity to counter a blow delivered by the opposition will likely be very narrow. Victory will go to the theater commander who begins executing the imperatives of the AirLand Battle soonest, carries the momentum longest, and does it fastest. The commander who

appreciates the impact of speed against decisive points in the third dimension will conduct air operations in the most decisive way and set the conditions for the application of protected combat power against campaign objectives.

[Appendix]

SUPPRESSION OF ENEMY AIR DEFENSE (CORP LEVEL)*

I. CORPS SUPPORT:

A. Corp Artillery

1. 155/203 fires 3-5 min. prior to penetration in area of penetration to 'open front door.'
2. Lift 'front door' fires 30 sec - 1 min. prior to penetration.
3. 155/203 fires 1-3 min immediately after penetration to 'close the back door.'
4. MLRS may be targeted against known SAM sites along penetration routes prior to package arrival.
5. MLRS fires lift 30 sec - 1 min. prior to package arrival.
6. MLRS/Lance fire against known SAM sites in target area.
7. MLRS/Lance lift fires 30 sec. - 1 min. prior to package arrival.
8. Repeat MLRS fires along egress route.
9. Repeat 155/203 fires at return penetration point.

B. Corps CEWI

1. Supports penetration and egress by targeting C³ nets within 10-15 KM of FLOT with jammers.
2. Coordinate actions with corps artillery [penetration and egress fires]

II. SUPPORTING AIR FORCE ELEMENT (WING/SQDN)

A. C³/Counterair/Refuel

1. Routes to penetration point coordinated by ATAC/CRC/TACC with Ground Control Intercept (might be AWACS)
2. AWACS assists with route control
3. Escort/enroute counterair support coordinated by AWACS.
4. Refuel support for counterair/EW/BAI aircraft coordinated/controlled by AWACS.
5. AWACS tracks mission aircraft throughout mission.

B. EW/ECM/ESM/ARM

1. Supports along the penetration routes to the target.
 - Compass Call jams air defense C³ nets.
 - EF-111 Jams EW Radars.
 - F4-G Targets SAM Fire Control Radars which attempt to lock on package w/ARMS.
 - TEREC monitoring threat sites for radar emissions, pass info to EF-111/F4-G
2. Support continues in target area.
3. Support continues along egress route.

*Adaptation of Marine Corps concept to corps level SEAD as presented by Maj. Joseph E. Noble, USMC

ENDNOTES

1. U.S. Army, Field Manual 100-5, Operations. (Washington, D.C.: Department of the Army, 1986), p. 4.
2. Baron De Jomini, The Art of War, (Westport, CN: Westport Press, 1971), p. 86.
3. FM 100-5, Operations, p. 10.
4. Col. L. D. Holder, 'Catching Up With Operational Art' (SAMS Reprint), p. 6.
5. FM 100-5, Operations, p. 25.
6. Holder, 'Catching Up With Operational Art,' p. 7.
7. Carl Von Clausewitz, On War, (Princeton, NJ: Princeton University Press, 1984), pp. 104 & 119.
8. FM 100-5, Operations, p. 10.
9. J.F.C. Fuller, DSO, The Foundations of the Science of War (Carlisle, PA: War College Reprint, Hudson & Co. LTD., Dec 1983), p. 82.
10. FM 100-5, Operations, p. 11.
11. Edward Luttwak, Israeli Army (Ft. Leavenworth, KS: School of Advanced Military Studies Reprint, Harper and Row, 1975;), pp. 196-200.
12. Ibid., p. 198.
13. Ibid., p. 218.
14. Ibid., p. 219.
15. LTC Gary M. Stewart, 'Protecting the Force; The Third Dimension of Operational Maneuver,' (Ft. Leavenworth, Kansas: School of Advanced Military Studies, 1987), p. 11.
16. Lieutenant General Saad El Shazly, The Crossing of the Suez (San Francisco, CA: American Mideast Research, 1980), p. 241.
17. Helen Cobban, 'The Lessons of the Lebanese War of 1982; A Soviet View,' Soviet Armed Forces Review Annual (Gulf Breeze, Fla.: Academic International Press, Vol. 10), p. 258.
18. Richard A. Gabriel, Operation Peace for Galilee (New York, NY: Hilland Wang, 1985), p. 120.

19. Max Hastings and Simon Jenkins, The Battle for the Falklands (New York, NY: Norton, 1983), pp. 116-117.
20. Ibid., p. 219.
21. Maj. Wm. F. McManaway, "U.S. Army Memorandum; Afghanistan Lessons Learned Trip" (U.S. Army Air Defense Artillery Center, Ft. Bliss, Tx: Office of Director, Concepts and Studies, Feb. 1989)
22. Ibid.
23. Ibid.
24. Ibid.
25. Army Battlefield Interface Concept for the periods 1986-1990, Various volumes are included under this heading. ABIC data for the outyears and in IEW is classified confidential and above.
26. FM 100-5, Operations, p 25.
27. The concept of tempo vs. window of opportunity was developed by Maj. John Carmichael, USA, SAMS; Graphics by author.
28. Luttwak, Israeli Army, p.219.
29. U.S. Army Command and General Staff College, Student Text 100-9, The Command Estimate (Fort Leavenworth, KS: U.S. Army Command and General Staff College, July 1986), p. 3-7
30. Hastings, The Battle for the Falklands, p. 219.
31. Fuller, The Foundations of the Science of War, p. 82.
32. Stewart, "Protecting the Force; The Third Dimension of Operational Maneuver," p. 12.
33. FM 100-5, Operations, p. 41.
34. FM 100-5, Operations, p. 25.
35. Holder, "Catching Up with Operational Art," p. 5.
36. Ibid.
37. Compiled from ADA Center data on synchronization and FM 100-2-3.
33. Janes Weapons Systems (New York, NY: Janes Pub. Co. Inc., 1987-88), pp. 122-123.

39. Operational Level IPB as presented by Col. Julian M. Campbell, MI, School of Advanced Military Studies.
40. U.S. Army Command and General Staff College, Field Circular 100-15-1, Corps Deep Operations, (Ft. Leavenworth, KS: U.S. Army Command and General Staff College, 1985), p. B-18
41. James Schneider, "The Theory of Operational Art; Theoretical Paper #3," (Fort Leavenworth, KS: School of Advanced Military Studies, 1988), p. 28.
42. Ibid., p. 28.
43. FC 100-15-1, Corp Deep Operations, pp. B-18-20.
44. U.S. Army, TC 34-130; Intelligence Preparation of the Battlefield (Approved Final Draft, Fort Huachuca, AZ: US Army Intelligence Center and School, January 1989), App-C.
45. Schneider, "Theoretical Paper #3," p. 28.
46. Stewart, "Protecting the Force," p.7.
47. Cobban, Lessons of the Lebanese War of 1982, pp. 258-266.
48. Ibid., p. 266.
49. Ibid., p. 266.
50. Schneider, "Theoretical Paper #3," p. 38.
51. FM 100-5, Operations. p. 14.
52. Ibid., p. 24.

BIBLIOGRAPHY

BOOKS

- Adan, Avraham. On the Banks of the Suez. San Francisco, CA: Presidio Press., 1980.
- Chaim, Herzog. The Arab Israeli Wars. New York, NY: Vintage Books, 1982.
- Clausewitz, Carl Von. On War. Edited and Translated by Michael Howard and Peter Paret, Princeton, NJ: Princeton University Press., 1984.
- Erikson, John, and Hansen, Lynn, and Schneider, William. Soviet Ground Forces: An Operational Assessment. Boulder, CO,: West River Press., 1986.
- Fuller, J.F.C, DSO. The Foundations of the Science of War. War College Reprint, Carlisle, PA: Hudson & Co. LTD., Dec 1983
- Gabriel, Richard A. Operation Peace for Galilee. New York, NY: Hill and Wang., 1985.
- Hastings, Max, and Jenkins, Simon. The Battle for the Falklands. New York, NY: Norton., 1983.
- Jomini, Baron De. The Art of War. Translated and Edited By G.H. Mendell and W.P. Craighill, Westport, CT: Westport Press., 1971.
- Lutwak, Edward. Israeli Army. SAMS Reprint, Ft. Leavenworth, KS: Harper and Row., 1975.
- Shazly, Lieutenant General Saad El. The Crossing of the Suez. San Francisco, CA: American Mideast Research., 1980.

THESIS AND MONOGRAPHS

- Schneider, James. "The Theory of Operational Art." School of Advanced Military Studies, Ft. Leavenworth, KS: 1988.
- Stewart, Lieutenant Colonel Gary M. "Protecting the Force: The Third Dimension of Operational Maneuver." School of Advanced Military Studies, Fort Leavenworth, KS: 1987.

FIELD MANUALS, PUBLICATIONS AND REFERENCE BOOKS

- U.S. Air Force. Air Force Manual 1-1. Basic Aerospace Doctrine of the United States Air Force, Washington, D.C.: Department of the Air Force., 1984.

U.S. Army. Field Manual 100-5, Operations. Washington, D.C.: Department of the Army., 1986.

Joint Chiefs of Staff Publication 26, Joint Doctrine for Theater Counterair Operations (From Overseas Land Areas). Washington, D.C.: The Joint Chiefs of Staff., 1986.

U.S. Army. Command and General Staff College Field Circular 100-15-1, Corps Deep Operations. Fort Leavenworth, KS: Command and General Staff College., 1985.

U.S. Army. Field Manual 100-2-1, The Soviet Army: Operations and Tactics. Washington D.C.: Department of the Army., 1984.

U.S. Army. Field Manual 100-2-3, The Soviet Army: Troops, Organization and Equipment. Washington, D.C.: Department of the Army., 1984.

U.S. Army. Training and Doctrine Command Pamphlet 525-45, General Operating Procedures for Joint Attack of The Second Echelon (J-SAK). Fort Monroe, VA.: U.S. Army Training and Doctrine Command, 1984.

PERIODICALS

Cobban, Helen. Soviet Armed Forces Review Annual, "The Lessons of the Lebanese War of 1982; A Soviet View." Gulf Breeze, FL: Academic International Press, Vol. 10., 1987.

Holder, Col. L.D. "Catching Up With Operational Art." Ft. Leavenworth, KS: School of Advanced Military Studies Reprint., 1988-89.

Janes Weapons Systems. New York, NY: Janes Publishing Co., 1987-88.

McManaway, Maj. William F. "U.S. Army Memorandum; Afghanistan Lessons Learned Trip." Ft. Bliss, TX: ATSA-CSD-TD (340d) 14 February 1989.